Information System for Honda Motorcycle Spare Part Palembang

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Abstract.
In practice, the industrial world that looks the same as the service industry requires the players to do a lot of quality improvement in order to compete. Its development is so rapid that many business actors use special tricks to run their business. Likewise with business actors from motorcycle service and service workshops, namely AHASS SPS Motor Palembang. The supply of spare parts that must always be there when customers need them is the main attraction for every workshop. But in reality, there is no special inventory management technique that can help partman to order spare parts in the following month. Therefore, this study will create a web-based spare part inventory information system that can control the amount of spare part stock and help predict the need for spare parts every month with the forecasting technique used, namely the Weighted Moving Average method. The results given from this system are suggestions of spare part stock forecast results with a user-friendly web-based display so that it can improve partman performance, maintain credibility and optimize workshop cashflow.

Keywords: *forecasting, information system, prototype, spare part, web based*

I. INTRODUCTION

PT Astra Honda Motor is a pioneer in the motorcycle industry in Indonesia under the trade name Honda products. PT Astra Honda Motor or commonly referred to AHM has developed its business entity not only assembling motorcycles but also sales showrooms, service services or motorcycle workshops for Astra Honda Authorized Service Stations (AHASS) and spare parts outlets. Currently, the business processes that are running at the AHASS SPS Motor Palembang workshop is selling motorcycle spare parts, where the inventory process has not used an information system that can predict inventory stock needs. Where in the end, the employee in charge of ordering spare parts (partman) has difficulty to distinguish which parts are in the fast-moving, slow-moving or non-moving categories.

This can lead to buildup of stock of goods or unavailability of stock in the workshop. There are two losses caused by incorrect procurement of spare parts, namely the loss of consumer loyalty due to incomplete spare part products and cash flow jams due to overstock [1] [2] [3]. According to Das Roy et al. [4], carrying out proper inventory management makes companies not only able to minimize costs but also maximize profits. Data-based inventory management can be one solution [5] [6]. The forecasting method is considered suitable to overcome existing problems and the Weighted Moving Average was chosen because it gives more weight to the last day, so it is considered more representative in making predictions [7]. Seeing the needs of the AHASS SPS Motor Workshop, a web-based inventory information system is needed. It is expected to be more user friendly which will later be able to help predict stock of spare parts need in the following month.

Information system

The system is a collection of elements that operate together to complete a goal [8]. While the notion of information is data that is processed into a form that is more useful and more meaningful for those who receive it [9]. So that the information system is a system within an organization that brings together daily transaction processing needs, supports operations, is managerial and strategic activities of an organization and provides certain outside parties with specified reports. Based on the above understanding, it can be concluded that the information system is an integrated system that is able to provide useful information for its users.

Forecasting

Forecasting is the activity of predicting or estimating what will happen in the future with a relatively long time [10]. Forecasting method is a way of estimating or estimating quantitatively or qualitatively what will happen in the future according to relevant data in the past [11]. The use of this forecasting method is to predict systematically and pragmatically on the basis of relevant data in the past. Thus the forecasting method can provide greater objectivity. Forecasting techniques are grouped into two categories, namely quantitative forecasting and qualitative forecasting. Quantitative forenlcasting is used to explain a set of mathematical rules on a series of past data to predict future results. While the use of qualitative forecasting is based on the consideration of individuals who are experts or experienced to predict future results [12]. There are six main factors identified as forecasting techniques and methods [13], namely:

1. Time Horizon

There are two aspects of the Time horizon that relate to each forecasting method. The first is the scope of time in the future, the second is the number of periods for the desired forecast.

2. Data Pattern

The main basis of the forecasting method is the assumption that the various patterns found in the forecasted data will be sustainable.

3. Type of Model

Models are a series in which time is described as an important element in determining changes in patterns. The models need to be considered because each model has a different ability to analyze the situation for decision making.

4. Cost

Generally there are 4 (four) cost elements involved in the use of a forecasting procedure, namely development costs, data storage, implementation operations and opportunities in the use of other techniques.

5. The accuracy of the forecasting method

The level of accuracy required is closely related to the level of detail required in a forecast.

6. Ease of application

Methods that are understandable and easy to apply are already a general principle for decision making.

Weighted Moving Average (WMA)

According to Ong [7] Weighted Moving Average is a forecasting method that is able to overcome the shortcomings of the Single Moving Average method which uses the same weighting every day. This method uses a linearly weighted moving average formula which gives more weight to the last day, so it is considered more representative in terms of predicting. The Weight Moving Average (WMA) method is a method that is suitable for use on time-series data, namely data that changes from time to time [14] [15]. Mathematically the weighted moving average is formulated in the equation below.

$$WMA = \frac{\sum data\ x\ bobot}{\sum bobot}$$

Where the data is the actual data in period t and the weight is an assessment according to the length of the period. Meanwhile, the error calculation formula is as follows:

$$Et = Xt - Ft$$

Where :

Et = Error value

Xt = Actual data in period t

Ft = Forecast data in period t

The accuracy of forecasting results is important in the forecasting system, namely how to measure the suitability between existing data and forecasting data. The measurement of the forecast error in the same units as the original series is calculated by the Mean Absolute Deviation (MAD) and the size of the error is known as the Mean Squared Error (MSE).

II. METHODS

This research is a descriptive study using the interview method to get an overview of the object under study. The data used in this research is spare part sales transaction data at AHASS SPS Motor and is monthly sales recapitulation data. The prototype approach or prototyping paradigm is used to build this information system. This method is very suitable to be applied in the software design process to be built. The stages in the prototype process model:

1. Initial stage

The design of the spare part inventory information system application requires a hardware device, namely a computer/laptop. Then the input data needed in the system is spare part sales data for the last six months as well as data from the parties involved in the AHASS SPS workshop, which are used for application test simulation data.

2. Build Prototyping

The development of spare part supply information applications is done by making an input and output design, the design consists of a process design that uses DrawSQL, Draw.io and Microsoft word in the design process.

3. System Coding

In this stage the prototyping has previously been evaluated and agreed upon and then translated into a programming language. In the interface design, the programming languages used are PHP, HTML, CSS, and Javascript. The making of this system is adjusted to the design to prevent deviating from what has been agreed upon.

4. Testing the System

Before the system is used, it is tested first. This is useful for minimizing errors or errors in the system. Application testing is carried out with direct input by the user from the application, witnessed by the examiner. The application testing process is carried out using the Black Box Testing method. Testing is based on application details such as the appearance of the application, the functions that exist in the application, and the suitability of the function flow with the business processes desired by the user.

5. Using the System

After the evaluation and testing process, the software that has been declared feasible is ready to be used for the purposes of forecasting the purchase of spare parts for the next period. Ended with the socialization process to related users.

III. RESULT AND DISCUSSION

The result of this research is a spare part inventory information system that can help predict orders for the next month, especially on AHASS SPS Motor. This system can ease the workload of the partman who has also served as a cashier in determining the order of spare parts every month. What's more, this system offers two main objectives, namely anticipating a shortage of spare parts that can lead to reduced customer loyalty and maintaining workshop cashflow by preventing overstock. The fact that so far the workshop (partman) has ordered spare parts by relying solely on the ability and experience of the partman, even though this is an important point in maintaining the credibility and quality of the workshop.

Proposed system design

The inventory forecasting process at AHASS SPS Motor uses the Weighted Moving Average (WMA) method, a method that focuses on the average weight in its calculations. Calculation of determining the supply of spare parts is carried out using monthly sales data for the last six months, then the weight of the sales data is determined. If you want to forecast the demand for May, the historical data needed is data from November to April. The system flow diagram that will be proposed in general is presented in Figure 1.

d <10 years. The characteristics of the employees' respondents can be seen in Table 1.

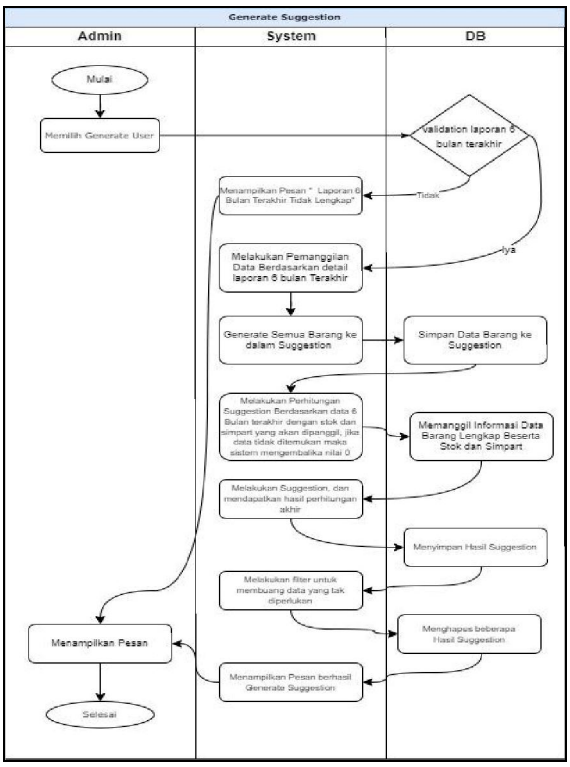

Fig 1. Flowchart of proposed information system

Class Diagram

This diagram is a description of a group of objects with the same prototype, behavior and relations. The class diagram used is as shown in Figure 2.

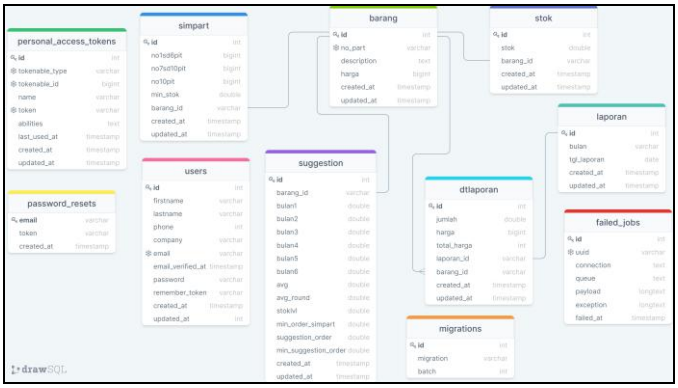

Fig 2. Class Diagram

Main page view

This page is the first screen when the admin browses and opens the page link. Admin can access after entering username and password.

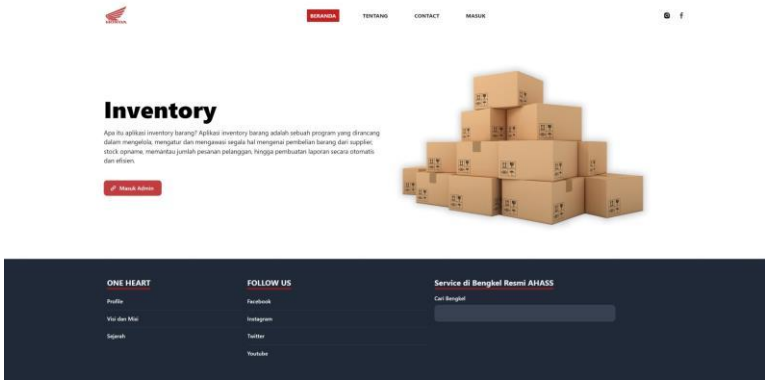

Fig 3. Login Page

Item list view

The item list display will contain the number of types of goods with details containing part numbers, item descriptions, and prices. Admin can delete and add item types if needed by doing the Add Item process.

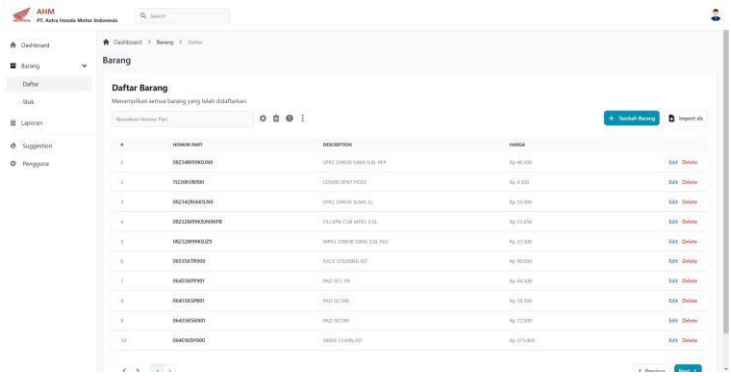

Fig 4. Item list view

Add Item View

Detail items to be added to the system can be filled in the Add Items process. This can be done if there are spare parts that are discontinued and the stock of goods in the warehouse has run out or new spare parts are due to the latest series motor output. What needs to be filled in in this process is the part number, item description and part price per unit.

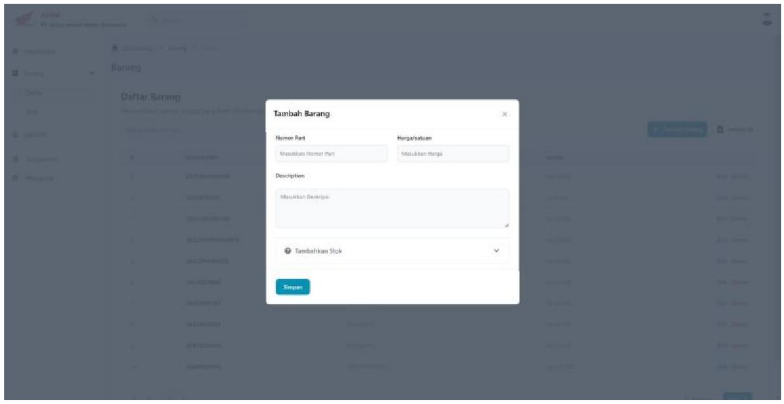

Fig 5. Add Item view

Stock List View

From all the views above, another advantage of this system is that this system has a complete stock list display with additional information on the minimum stock quantity that must be met by the workshop based on AHM standards. The number of items that are hundreds of types makes this system very useful because it is able to minimize errors in routine purchases of spare part stock every month. Changes in the amount of stock can also be made by filling in the details in the Update Stock process.

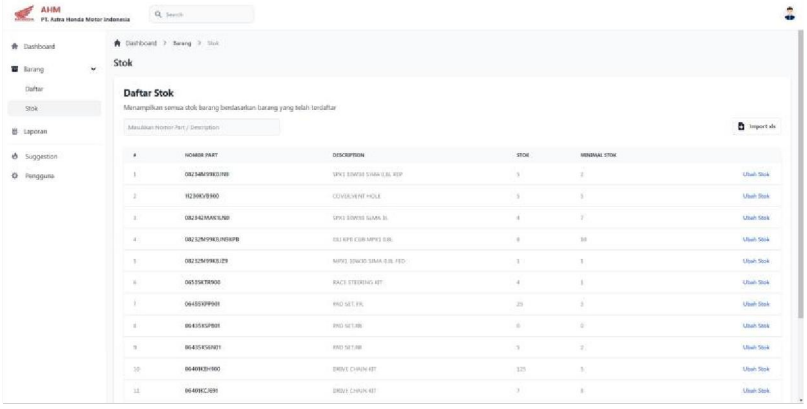

Fig 6. Stock List view

Report List View

To facilitate the forecasting process, the admin simply uploads a monthly report from the sales of spare parts which is then inputted into the Reports page. To predict the stock of spare parts for the next month, historical data from the past six months is needed. The data is withdrawn at the end of each month because the spare part order schedule must be submitted at the beginning of each month to AHM. In this process, admins can create reports in Microsoft Excel with available formats and then only need to upload them in the Import xls process.

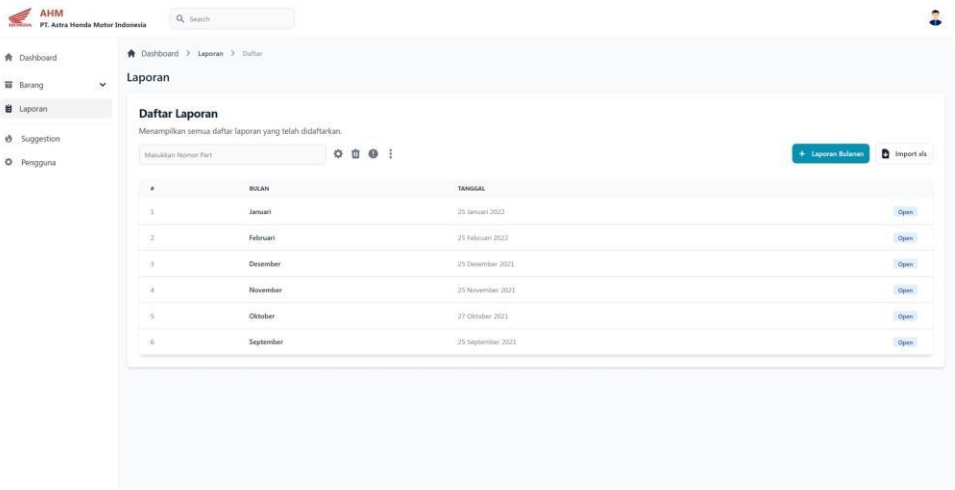

Fig 7. Report List view

Suggestion Display

If the admin has fulfilled the monthly report, a list of spare parts will be attached which need to be purchased based on forecasting using the Weighted Moving Average. There is a minimum order column and a minimum suggestion order column which is related to the minimum stock regulation that must be met by the workshop. Meanwhile, suggestion orders are numbers that emerge from the forecasting process based on data from the last six months that have been registered in the monthly report. So that the admin does not need to make a separate report, there is a Generate Suggestion menu where the order suggestion report that appears is exported to Microsoft Excel and is ready to be submitted to AHM as a list of spare part stock that you want to buy. So with this information system, it is expected to reduce spare part ordering errors and if this process must be carried out by other people / new people, this is no longer an obstacle. This information system is also expected to be developed and used by all AHASS, especially those that only serve the sale and purchase of spare parts. One of the efforts to maintain optimal cash flow is to optimize the purchase of new spare parts and reduce inventory costs.

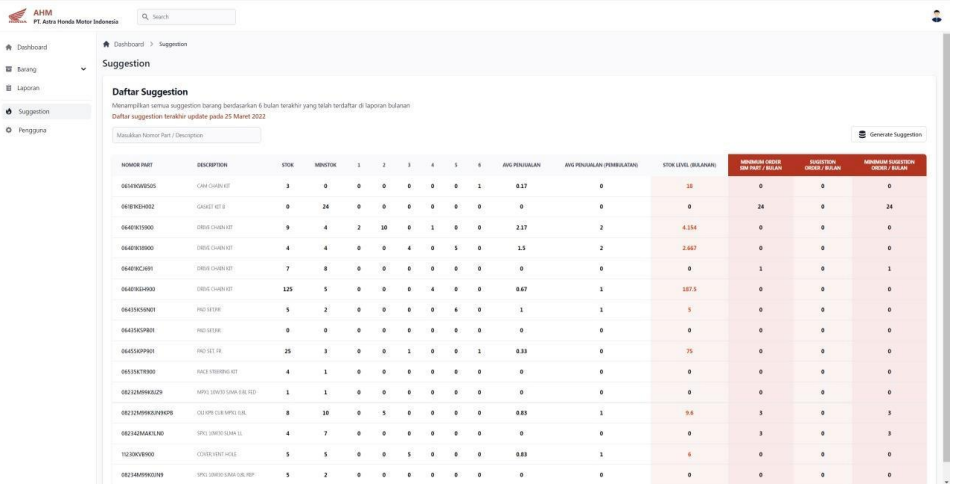

Fig 8. Suggestion Display

IV. CONCLUSION

The conclusion of the implementation of the inventory information system is a web-based and easy-to-operate information system, accelerates decision-making on ordering spare parts for the following month and access to manage information systems that can also be used by the head of the workshop as a form of monitoring and also takes part in decision making. Furthermore, this information system will provide a solution to the possibility of stockout or overstock of goods so that the credibility of the workshop will be maintained and the cashflow of the workshop will be optimal.

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